

REMARKS/ARGUMENT

Claims 8-21 are pending in this application. Claims 8-21 stand rejected under 35 U.S.C. §112, second paragraph. By this amendment, Applicants are amending the claims as recited above and submit that all rejections under 35 U.S.C. §112 should now be withdrawn.

With respect to the rejections under 35 U.S.C. §112, second paragraph, it is believed that the Examiner has misunderstood the claims. Claim recites a disk-like vibration plate, for example, the plate 2' having a circular vibration surface, i.e., the upper surface of the plate shown in Figs. 1A, 1B and 1C. The vibration surface has an outer periphery. The outer periphery is the outer edge of the vibration plate. Further, the claim recites a support member. This is the member 4 which, as shown, is a cylinder. The support member 4 is coupled to the disk-like vibration plate 2' along a circular path. The circular path is the top edge of the cylinder 4 shown for example, in Fig. 1C. The circular path is located inside the outer periphery, i.e., it is located within the vibration plate outer periphery defined by the outer edge of the vibration plate.

Further, the circular path defined by the cylinder 4 divides the vibration surface into an inner region as shown in Fig. 1A, 1B and 1C and an outer region as shown in Fig. 1A, 1B and 1C. The piezoelectric element 1 is coupled to the central region of the disk-like vibration plate 2' to cause the inner and outer regions shown in Figs. 1A, 1B and 1C to vibrate in substantially the same phase. It is believed that the claim is sufficiently definite and accurately claims the invention. Accordingly, it is submitted that the rejection of claim 8 under 35 U.S.C. §112 should be withdrawn.

With respect to claim 9, this claim recites that the circular path defines a vibration node of the vibration plate. This means that the location of the circular path, i.e., the location of the circular path on the vibration plate will define a vibration node. It is submitted that this claim is sufficiently definite to one of skill in the art.

With respect to claim 11, this claim recites that the support member, i.e., the member 4, is coupled to a cylindrical base member, i.e., member 2, having an outer periphery which lies outside of the circular path, i.e., the circular path defined by the edge of the support member 4. As shown in Figs. 1A-1C, the outer periphery of the cylindrical base member 2 lies outside of the circular path defined by the top edge of the cylindrical support member 4. This is shown most

clearly by Fig. 1C which shows that the circular path is inside the outer periphery of the cylindrical base member 2.

With respect to claim 13, this refers to the groove that is formed between the vibration plate 2' and the base member 2, as shown in the various figures and that a vibration damping member 3, as shown in Fig. 5A, is located in the groove. It is submitted that claim 13 is also sufficiently definite. It appears that the Examiner is confusing the support member and the base member. The support member is the element 4. The base member is the element 2.

With respect to claim 19, this claim recites that the groove as described above is located directly below the outer region and a vibration damping member, for example, element 3 shown in Fig. 5A, is located in the groove. This is shown clearly in Fig. 5A. Applicants submit that claim 19 is also sufficiently definite.

In view of the above explanations, it is submitted that the rejections of the claims under 35 U.S.C. §112 should be withdrawn.

Applicants submit that all amendments to the claims have not narrowed the claims but have merely clarified the claims. Accordingly, it is submitted that the claims are entitled to a full range of equivalents under the Doctrine of Equivalents.

Claims 8-13 and 17-19 stand rejected under 35 U.S.C. §102(b) as being anticipated by or in the alternative under 35 U.S.C. §103(a) as obvious over Yamamoto et al. Furthermore, claims 14-16, 20 and 21 stand rejected under 35 U.S.C. §103 as being unpatentable over Yamamoto et al. in view of the ordinary skill in the art.

Applicants submit that the Yamamoto reference, taken alone or in combination, with the knowledge of one of ordinary skill in the art, does not teach or suggest the present invention. The Yamamoto et al. device shows a piezoelectric acoustic transducer that includes a metal plate 5, a piezoelectric ceramic disk 6 supported on a cylindrical casing 3b. The plate 5 is clamped between the cylinder 3b and an upper casing 2. The casing 2 is disposed on a side opposite the side on which the cylindrical casing 3b is disposed.

In contrast, the present invention, according to claim 1 recites an ultrasonic vibration apparatus comprising a disk like vibration plate having a circular vibration surface, said vibration surface having an outer periphery, a support member coupled to said disk like vibration plate

along a circular path located inside said outer periphery of said circular vibration surface so as to divide said vibration surface into inner and outer regions; and a piezoelectric element coupled to a central region of said disk-like vibration plate to cause said inner and outer regions to vibrate in substantially the same phase.

In contrast to the device of Yamamoto et al., the device of the present invention includes a disk-like vibration plate 2' which is supported on a support member 4. The support member 4 divides the vibration surface of the plate 21 into inner and outer regions. Significantly, because the support member 4 is disposed on the same side as the cylindrical chasing 2, the outer region as shown in Fig. 1A and 1B of the vibration plate is free to vibrate as is the inner region. In contrast, in the Yamamoto device, because the outer regions are clamped by the casing 2, the metal plate 5 is only free to vibrate in the inner regions. Accordingly, the Yamamoto device cannot teach or suggest the present invention.

New claims 22 and 23 have also been added by this amendment. Claim 22 makes it clear that the casing and support member are disposed on the same side of the vibration plate, in contrast to Yamamoto et al. where the casing and support member are disposed on opposite sides. This prevents the metal plate of Yamamoto et al. from vibrating freely in both its inner and outer regions. Accordingly, claim 22 is submitted to be patentable over the Yamamoto reference, taken alone or in combination with the knowledge of one ordinary skill in the art.

Claim 23 has also been added which recites that the vibration plate is free to vibrate in its outer region. For the same reasons discussed above, the Yamamoto reference, taken alone or in combination with the skill of one of ordinary skill in the art, fails to teach or suggest the present invention.

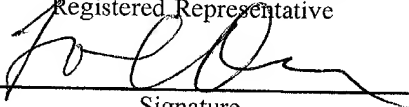
Applicant submits that the scope of the claims has not been narrowed by the above amendment and that therefore all the claims are entitled to full range of equivalents under the Doctrine of Equivalents.

In view of the above, Applicant submits that all claims in this application are now in condition for allowance, prompt notification of which is requested.

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Date of Signature

Respectfully submitted,



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